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(71)Applicant : MITSUBISHI ELECTRIC CORP

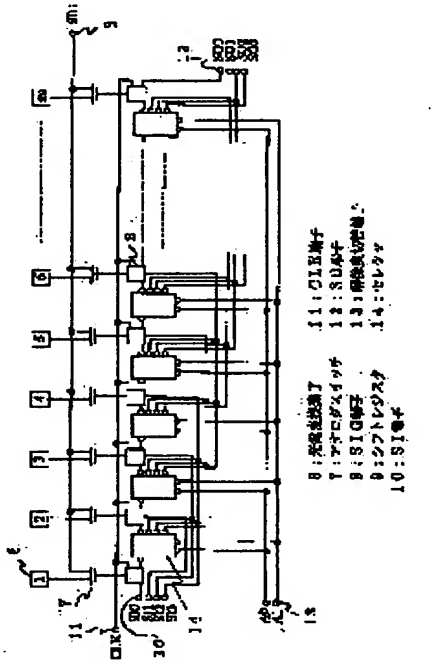
(72)Inventor : ABE ICHIHIRO

(54) IMAGE SENSOR

(57)Abstract:

PROBLEM TO BE SOLVED: To solve the problem that the scale of a circuit is increased, for example, accessory circuits are increased since it is necessary to increase shift registers in order to switch resolution in a conventional image sensor unit.

SOLUTION: A selector 14 to be controlled by a resolution switching signal is arranged between shift registers 9 for supplying signals to the gates of analog switches 7 for controlling the outputs of a plurality of linearly arranged photoelectric converting elements 6, and the logic of the resolution switching signal is switched so that the connection of the selector 14 can be changed, and that the connection of the shift register 9 can be changed. Thus, it is possible to switch the resolution of the image sensor.



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[Date of extinction of right]	

* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] In the image sensors constituted so that resolution might be changed, it is arranged in the shape of a straight line. Respectively corresponding to the above-mentioned optoelectric transducer, it is arranged so that two or more optoelectric transducers which change a lightwave signal into an electrical signal, respectively, and the output of this optoelectric transducer may be chosen. It is arranged, respectively between two or more shift registers which operate in predetermined sequence synchronizing with a clock, and an adjoining shift register. Image sensors characterized by having two or more selectors constituted so that connection between shift registers might be changed according to the resolution change signal which directs the change of resolution.
[Claim 2] Resolution change signals are image sensors according to claim 1 characterized by consisting of 2 bits.
[Claim 3] Resolution change signals are image sensors according to claim 1 characterized by consisting of N bits (however, N, integer of N> 2).
[Claim 4] Resolution change signals are the image sensors of claim 1 characterized by changing logic synchronizing with a clock - claim 3 given in any 1 term.
[Claim 5] Modification of the logic of a resolution change signal is image sensors according to claim 4 characterized by being carried out so that it may correspond to some manuscripts read by the optoelectric transducer.
[Claim 6] Resolution change signals are image sensors according to claim 4 characterized by changing logic a fixed period.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the image sensors which have two or more optoelectric transducers arranged on a straight line.
[0002]
[Description of the Prior Art] The contact type image sensor used for facsimile, a copy machine, a hand scanner, etc. has two or more optoelectric transducers arranged on a straight line, and by closing the switch on which the output signal from each optoelectric transducer was connected to each component, respectively with a shift register, one by one, picking, it takes out and it changes image information into the electrical signal of time series. Drawing 8 is the schematic diagram showing the configuration of conventional image readout equipment. In drawing 8 , 1 is an image-sensors unit, 2 is the optoelectric-transducer circuit IC of the image-sensors unit 1, and the sensing-element train of this IC consists of 1728 optoelectric transducers on the whole to eight manuscript paper, i.e., the A4 version, per mm. The manuscript in which 3 is read with the image-sensors unit 1, the selfoc-lens array arranged so that the image of a manuscript may connect 4 to an optoelectric transducer between the image-sensors unit 1 and a manuscript 3, and 5 are the light emitting diode trains arranged at the both sides of the selfoc-lens array 4, and a manuscript 3 is irradiated with the light of this light emitting diode train 5. The shift register, analog switch, and signal amplifying circuit which were IC-ized are arranged in the optoelectric-transducer circuit IC 2.
[0003] The basic circuit and timing chart for driving this image-sensors unit 1 are respectively shown in drawing 9 and drawing 10 . Drawing 9 is drawing showing the basic circuit which drives the conventional image sensors. In drawing 9 , 6 is 128 optoelectric transducers, and a number is attached in order and it is constituted by the photodiode of a thin film, or the photoconduction thin film. Although not shown in drawing, each optoelectric transducer 6 has a common electrode, and it is grounded, or suitable bias voltage is impressed. It is SI terminal into which, as for the SIG terminal whose 7 is an analog switch, and whose 8 is an output-signal line, and 9, a shift register is inputted into, and, as for 10, the start signal of a shift register 9 is inputted. The CLK terminal into which, as for 11, a clock is inputted, and 12 are SO terminals with which the end signal of a shift register 9 is outputted. The optoelectric transducer 6 of drawing 9 flows for the SIG terminal 8 which is an output signal line by impressing an electrical potential difference to the gate of an analog switch 7 by 1 to 1. It connects with each stage of a shift register (in the case of drawing, they are 128 steps) 9, and the gate of each analog switch 7 opens and closes an analog switch 7 with the signal from a shift register 9.
[0004] Drawing 10 is the timing chart of the circuit of drawing 9 . Next, actuation is explained. If a start signal is inputted into the SI terminal 10 of a shift register 9 as shown in drawing 10 , a shift register 9 begins actuation and closes the 1st gate and the 2nd gate one by one according to the clock pulse inputted into the CLK terminal 11. A signal is outputted to the SO terminal 12 at the same time the 128th gate is closed. If the SO terminal 12 and the SI terminal 10 of the next optoelectric-transducer circuit IC 2 are connected, the gate 7 of an optoelectric transducer 6 can be opened and closed one by

one.
[0005]
[Problem(s) to be Solved by the Invention] Drawing 11 is drawing showing the resolution electronic switch of the conventional image sensors. In drawing 11 , 6-12 are the same as that of the thing in drawing 9 . 13 is a resolution change terminal into which a resolution change signal is inputted. 14 is a selector arranged at the preceding paragraph of a shift register 9, and is connected to the SI terminal 10 and the resolution change terminal 13. In addition, the shift register consists of 8-dot [/mm] 9of shift registers a, and 4 dot [/mm] 9of shift registers b. The resolution of image sensors for example, when changing [mm] from 8 dots/mm like drawing 9 in 4 dots / If a selector 14 is formed in front of a shift register like drawing 11 and a start signal is inputted into the SI terminal 10, by the logic of the resolution change terminal 13 inputted into a selector 14 SI signal is inputted into one of the shift registers of 8 dot [/mm] 9of shift registers a, or 4-dot [/mm] 9of shift registers b, and the change of resolution is attained.
[0006] In a circuit like drawing 11 , it will have to have shift register 9b other than shift register 9a, and a shift register circuit will increase. To low-resolution-izing beyond it, for example about 2 dots/mm of resolution, one more step of shift register of the one half of 4-dot [/mm] 9of shift registers b must be prepared, more, an attached circuit becomes complicated or the magnitude of the optoelectric-transducer circuit IC 2 becomes larger.
[0007] Moreover, in low resolution-ization which adds shift register 9b like drawing 11 , resolution is not selectively made high, or actuation which makes resolution low selectively cannot be performed on the same optoelectric-transducer circuit IC 2.
[0008] This invention is aimed at obtaining the image sensors which can change resolution free, without having been made in order to solve the above technical problems, and increasing the number of shift registers.
[0009]
[Means for Solving the Problem] In the image sensors concerning this invention Two or more optoelectric transducers which are arranged in the shape of a straight line, and change a lightwave signal into an electrical signal, respectively, Two or more shift registers which are arranged respectively corresponding to an optoelectric transducer so that the output of this optoelectric transducer may be chosen, and operate in predetermined sequence synchronizing with a clock, It is arranged between adjoining shift registers, respectively, and has two or more selectors constituted so that connection between shift registers might be changed according to the resolution change signal which directs the change of resolution.
[0010] Moreover, the resolution change signal consists of 2 bits. Moreover, the resolution change signal consists of N bits.
[0011] Furthermore, as for a resolution change signal, logic is changed synchronizing with a clock. Moreover, a change of the logic of a resolution change signal is made so that it may correspond to some manuscripts read by the optoelectric transducer. Moreover, as for a resolution change signal, logic is changed a fixed period.
[0012]
[Embodiment of the Invention] The whole image-sensors unit configuration by the gestalt 1 of gestalt 1. implementation of operation is the same as drawing 8 . Drawing 1 is drawing showing the resolution electronic switch using the selector of the image sensors by the gestalt 1 of implementation of this invention. In drawing 1 , 6 is 128 optoelectric transducers, and a number is attached in order and it is constituted by the photodiode of a thin film, or the photoconduction thin film. Although not shown in drawing, each optoelectric transducer 6 has a common electrode, and it is grounded, or suitable bias voltage is impressed. The shift register which the analog switch with which 7 controls the output of an optoelectric transducer 6, the SIG terminal whose 8 is an output signal line, and 9 are arranged so that it may correspond to an optoelectric transducer 6, and outputs a signal to the gate of an analog switch 7, and 10 are SI terminals into which the start signal of a shift register 9 is inputted. The CLK terminal into which, as for 11, a clock is inputted, and 12 are SO terminals with which the end signal of a shift

register 9 is outputted. 13 is a resolution change terminal into which a 2-bit resolution change signal is inputted. 14 is a selector arranged between each stage of a shift register 9, and the resolution change terminal 13 is connected.

[0013] Fundamental actuation of the circuit of drawing 1 is the same as what was stated by drawing 9 , and by impressing an electrical potential difference to the gate of an analog switch 7 by 1 to 1, an optoelectric transducer 6 is chosen and flows for the SIG terminal 8 which is an output signal line. It connects with each stage of a shift register (in the case of drawing, they are 128 steps) 9, and the gate of each analog switch 7 opens and closes an analog switch 7 with the signal given in predetermined sequence from a shift register 9. Drawing 2 is drawing showing the logic of the selector of the image sensors by the gestalt 1 of implementation of this invention. In drawing 2 , 14 is a selector. Drawing 3 is the timing chart of the image sensors by the gestalt 1 of implementation of this invention.

[0014] Next, actuation is explained. If the selector 14 is formed between shift registers 9 and logic of the selector 14 of operation is carried out as drawing 2 For example, if an optoelectric transducer 6 is the resolution (from Y0 to an output) which is 8 dots/mm and the input of the resolution change terminal 13 of a selector 14 is set to A[0:1] =1 to obtain 4 dots/mm of outputs of the one half It becomes possible like the timing chart shown in drawing 3 in the output of an optoelectric transducer 6 to thin out and output the 1st, 3, and 5 ... and 1 dot (from Y1 to an output). Moreover, to carry out resolution in 2.67 dots/mm which is 1/3 [8 dots //mm] To carry out [mm] resolution in 2 dots /which is 1/4 [8 dots //mm] that what is necessary is just to set the input of the resolution change terminal 13 of a selector 14 to A[0:1] =2 (from Y2 to an output) It becomes possible to change the resolution of an image what is made A[0:1] =3 (from Y3 to an output).

[0015] According to the gestalt 1 of operation, the change of resolution is attained free, without increasing a shift register.

[0016] Gestalt 2. drawing 4 of operation is the timing chart of the image sensors by the gestalt 2 of implementation of this invention. Drawing 5 is drawing showing the high resolution section in the manuscript of the image sensors by the gestalt 2 of implementation of this invention. As for a manuscript and 15, in drawing 5 , 3 is [a high resolution field and 16] low resolution fields.

[0017] In a circuit like drawing 1 , not only operation like the gestalt 1 of operation but the thing for which resolution is changed selectively is possible. The timing chart in that case becomes possible [changing the number of infanticide of the shift register 9 in that case (number which flies a register)] by synchronizing the input signal A1 of a selector 14 with a clock, and changing logic like drawing 4 . By it, the high resolution field 15 which needs high resolution reading is in the reading manuscript 3 selectively like drawing 5 . When the low resolution field 16 which is a low resolution is sufficient, others whenever [high image / of drawing 5] only the part of a field 15 The resolution change terminal 13 of a selector 14 can be set as input signal A[0:1] =0, high resolution can be obtained, and others can obtain a high resolution image selectively by setting the resolution change terminal 13 of a selector 14 as input signal A[0:1] =3.

[0018] According to the gestalt 2 of operation, it becomes possible by reading the image of high resolution selectively to read the whole manuscript early from the case where the whole image is read with high resolution.

[0019] Gestalt 3. drawing 6 of operation is the timing chart of the image sensors by the gestalt 3 of implementation of this invention. In circuitry like drawing 1 , a selector 14 to timing as shown in drawing 6 If a signal is first given from the SI terminal 10 (SI2), an input signal is changed to A[0:1] =1 and A[0:1] =2 for every clock, the resolution change terminal 13 is thinned out and a number is changed An output bit can also obtain an irregular output bit like the 3rd, and 5, 8, 10 and 13 (flying 2 bits and flying 1 bit 2 bits ...). By this, if an optoelectric transducer 6 carries out in 8 dots/mm, it can obtain 3.2 dots (8/5x2 dots/(mm))/mm of resolution in false, and can respond to more resolution. In addition, although **** explained the case where the logic of a resolution change signal was changed for every clock, false resolution can be formed if a resolution change signal is changed a fixed period.

[0020] For every fixed period, by changing resolution, false resolution can be obtained and, according to the gestalt 3 of operation, it can respond to more resolution.

[0021] In the gestalten 1-3 of gestalt 4. implementation of operation, although explanation was given for the input to the resolution change terminal 13 of a selector 14 by the case of 2 bits, even if it is the number of bits beyond it, it is convenient in any way. If it is made a triplet like drawing 7 , what seven bits are thinned out for (it flies) will become possible. For example, if an optoelectric transducer 6 carries out in 8 dots/mm, in a minimum of 1 dot/mm, low resolution-ization is still attained and it can respond about more resolution.
[0022] According to the gestalt 4 of operation, it can respond to more resolution by increasing the input number of bits to a resolution change terminal.
[0023]
[Effect of the Invention] Since this invention is constituted as explained above, it does effectiveness as taken below so. Two or more optoelectric transducers which are arranged in the shape of a straight line, and change a lightwave signal into an electrical signal, respectively, Two or more shift registers which are arranged respectively corresponding to an optoelectric transducer so that the output of this optoelectric transducer may be chosen, and operate in predetermined sequence synchronizing with a clock, Since it had two or more selectors constituted so that connection between shift registers might be changed according to the resolution change signal which is arranged between adjoining shift registers, respectively and directs the change of resolution Resolution can be changed free, without newly preparing a shift register.
[0024] Moreover, since the resolution change signal consists of 2 bits, the change of four kinds of resolution is possible for it. Moreover, since the resolution change signal consists of N bits, the change of the resolution of varieties is possible for it.
[0025] Furthermore, since logic is changed synchronizing with a clock, a resolution change signal can change resolution synchronizing with a clock. Moreover, since a change of the logic of a resolution change signal is made so that it may correspond to some manuscripts read by the optoelectric transducer, it can respond to the manuscript of high resolution selectively.
[0026] Moreover, since logic is changed a fixed period, a resolution change signal can form resolution in false.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is drawing showing the resolution electronic switch using the selector of the image sensors by the gestalt 1 of implementation of this invention.
[Drawing 2] It is drawing showing the logic of the selector of the image sensors by the gestalt 1 of implementation of this invention.
[Drawing 3] It is the timing chart of the image sensors by the gestalt 1 of implementation of this invention.
[Drawing 4] It is the timing chart of the image sensors by the gestalt 2 of implementation of this invention.
[Drawing 5] It is drawing showing the high resolution section in the manuscript of the image sensors by the gestalt 2 of implementation of this invention.
[Drawing 6] It is the timing chart of the image sensors by the gestalt 3 of implementation of this invention.
[Drawing 7] It is drawing showing the logic of the selector of the image sensors by the gestalt 4 of implementation of this invention.
[Drawing 8] It is the schematic diagram showing the configuration of conventional image readout equipment.
[Drawing 9] It is drawing showing the basic circuit which drives the conventional image sensors.
[Drawing 10] It is the timing chart of the circuit of drawing 9 .
[Drawing 11] It is drawing showing the resolution electronic switch of the conventional image sensors.
[Description of Notations]
1 A sensor unit, 2 The optoelectric-transducer circuit IC, 3 A manuscript, 4 A selfoc-lens array, 5 A light emitting diode train, 6 An optoelectric transducer, 7 An analog switch, 8 A SIG terminal, 9 A shift register, 10 SI terminal, 11 A CLK terminal, 12 SO terminal, 13 A resolution change terminal, 14 A selector, 15 A high resolution field, 16 Low resolution field.

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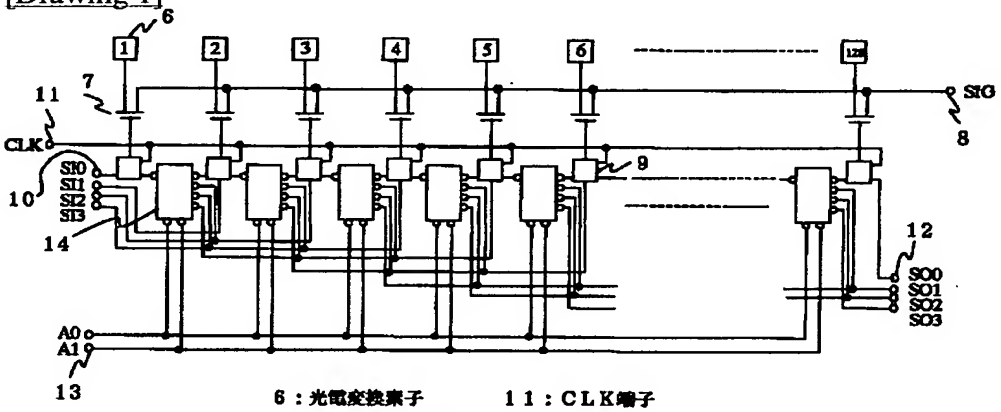
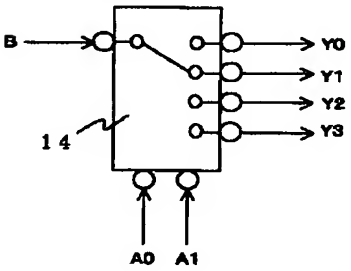
DRAWINGS

[Drawing 1]



6：光電変換素子　11：CLK端子
7：アナログスイッチ　12：SO端子
8：SIG端子　13：解像度切替端子
9：シフトレジスタ　14：セレクタ
10：SI端子

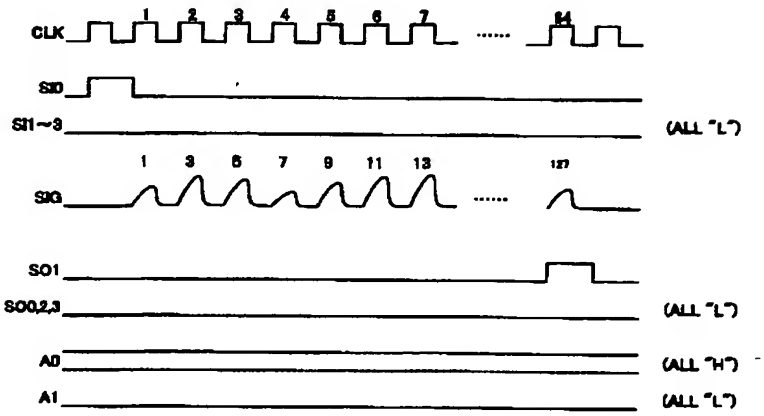
[Drawing 2]



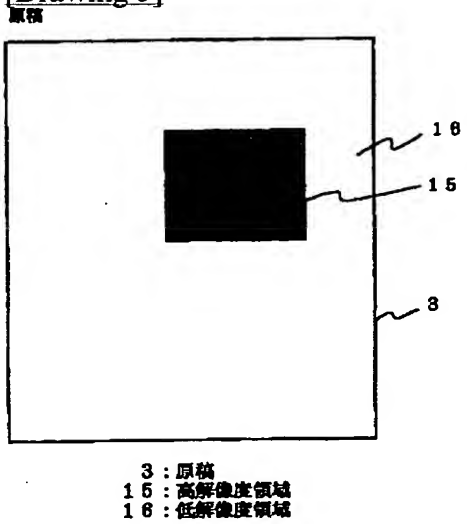
セレクタの論理

入力		出力			
A0	A1	Y0	Y1	Y2	Y3
L	L	B	×	×	×
H	L	×	B	×	×
L	H	×	×	B	×
H	H	×	×	×	B

[Drawing 3]

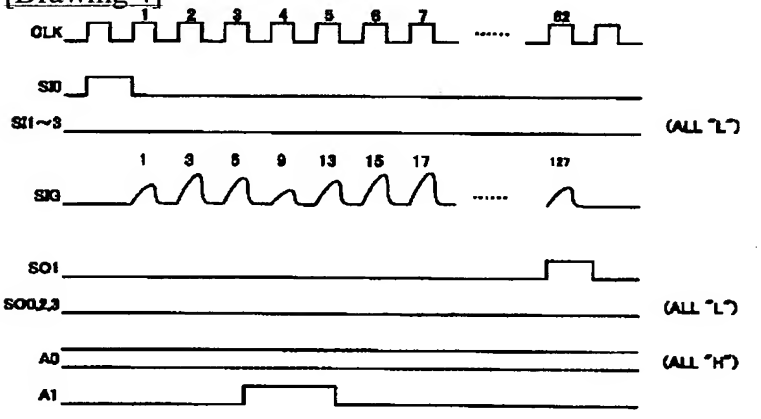


[Drawing 5]

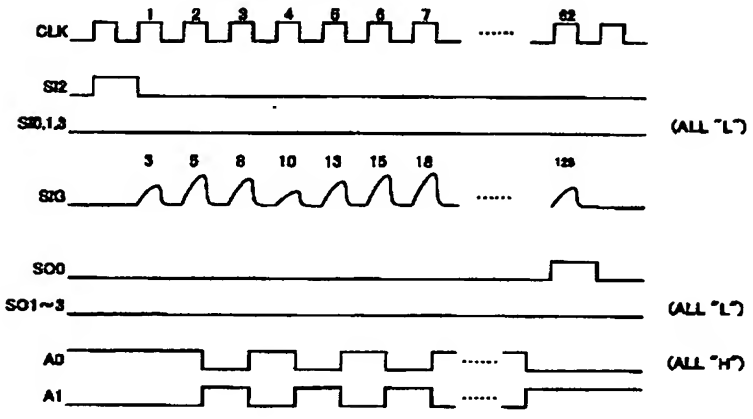


3：原稿
15：高解像度領域
16：低解像度領域

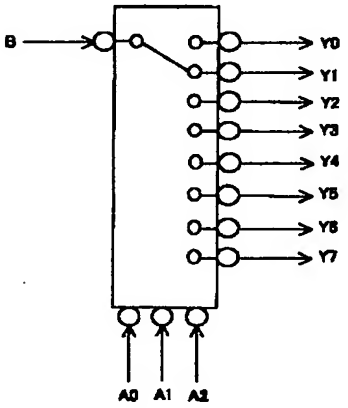
[Drawing 4]



[Drawing 6]



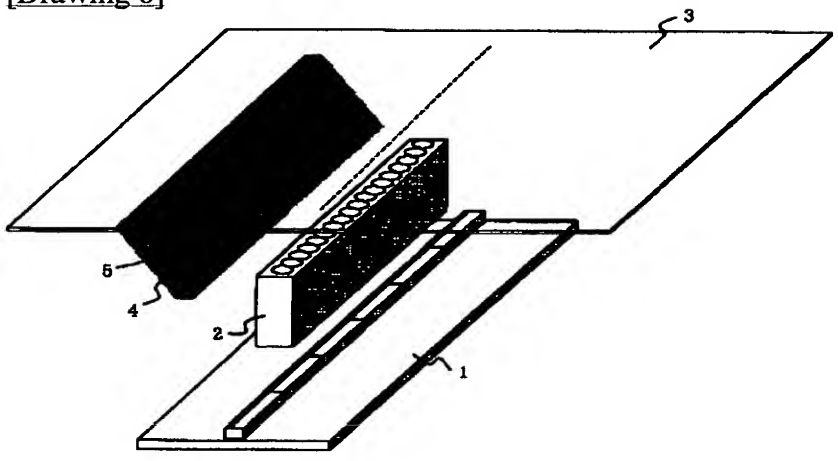
[Drawing 7]



セレクタの論理

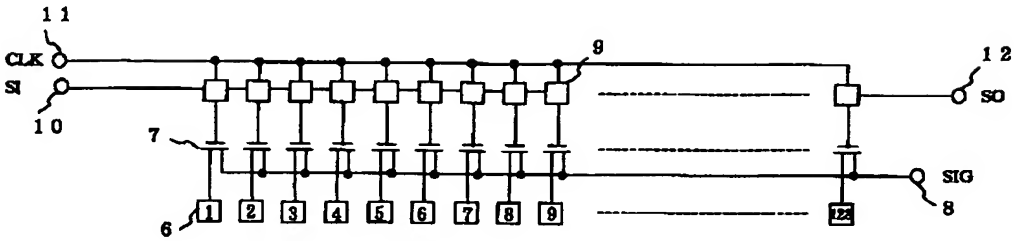
入力			出力							
A0	A1	A2	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
L	L	L	B	×	×	×	×	×	×	×
H	L	L	×	B	×	×	×	×	×	×
L	H	L	×	×	B	×	×	×	×	×
H	H	L	×	×	×	B	×	×	×	×
L	L	H	×	×	×	×	B	×	×	×
H	L	H	×	×	×	×	×	B	×	×
L	H	H	×	×	×	×	×	×	B	×
H	H	H	×	×	×	×	×	×	×	B

[Drawing 8]

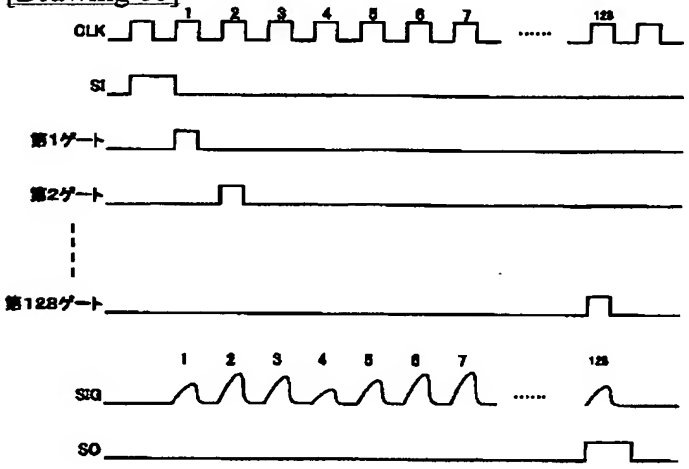


1：センサユニット
2：光電変換素子回路ＩＣ
4：セルフォックレンズアレイ
5：発光ダイオード列

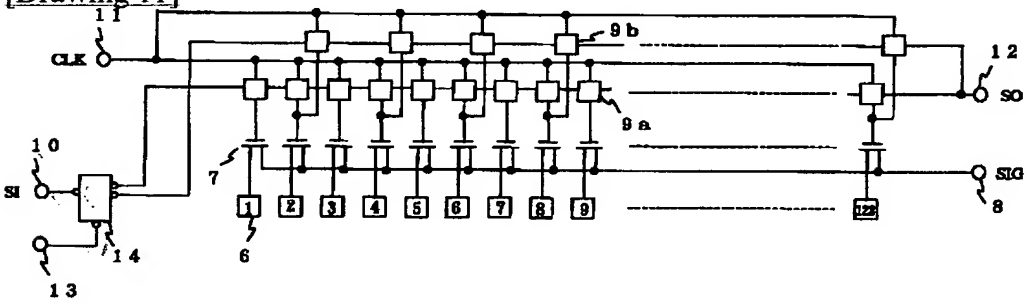
[Drawing 9]



[Drawing 10]



[Drawing 11]



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